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REMARKS

I. Introduction

In response to the Office Action dated January 24, 2007, claims 1, 4, 9, 12, and 17, have been amended. Claims 1-24 remain in the application. Re-examination and re-consideration of the application, as amended, is requested.

II. Unknown Status of Claims 5-6, 13-14 and 23-24

The Office Action rejects claims 5-6, 13-14 and 23-24 under 35 U.S.C. § 101, but does not reject these claims as unpatentable in view of the prior art. Nor does the Office Action indicate that these claims would be allowable if written in independent form. The Applicants are therefore uncertain as to the status/allowability of these claims or the reasons for their rejection.

III. Claim Amendments

Applicants' attorney has made amendments to the claims as indicated above. These amendments were made solely for the purpose of clarifying the language of the claims, and were not required for purposes of patentability.

IV. Office Action Subject Matter Rejection

In paragraph 2, the Office Action rejects claim(s) 1, 9, and 17 under 35 U.S.C. § 101 as merely reciting a series of steps without concluding how the equalization of digital data signals as recited in the preamble is done. Claims have been amended to recite equalization of the signals. The Applicant believes the claims to be allowable as currently amended. Should issues still remain in this regard, the Applicants requests that the Examiner indicate how the rejection can be overcome and how problems may be resolved, in accordance with the directives of the Examination Guidelines for Computer-Related Inventions. See Guidelines II M.P.E.P. § 2106. Specifically, should it be necessary, the Applicants request that the Examiner identify features of the invention that would render the claimed subject matter statutory if recited in the claim.

V. The Cited References and the Subject Invention

A. The Arslan Reference

U.S. Patent No. 6,574,235, issued June 3, 2003 to Arslan discloses a method for receiving a plurality of communications from a respective plurality of transmitters using a common carrier frequency includes receiving a plurality of information signals on a common carrier frequency corresponding to the plurality of communications from the plurality of transmitters, and generating first and second separated signals corresponding to respective first and second ones of the information signals so that the first separated signal includes a primary component corresponding to the first information signal and so that the second separated signal includes a primary component corresponding to the second information signal. The first separated signal is demodulated to provide an estimate of a first information sequence corresponding to the first information signal, and the estimate of the first information sequence is modulated to provide a modulated estimate of the first information sequence. The modulated estimate of the first information sequence is subtracted from the second separated signal to provide an improved second separated signal. The improved second separated signal is demodulated to provide an estimate of a second information sequence corresponding to the second information signal. Related receivers are also discussed.

B. The Smee Reference

U.S. Patent No. 6,522,683, issued February 18, 2003 to Smee discloses a receive filter receives signals from a communication channel. The received signals correspond to original Walsh covered chip sequences transmitted by a transmit filter through the communication channel to the receive filter. The received signals are processed by an equalizer to generate a soft estimate of chip sequences corresponding to the original Walsh covered chip sequences. An N chip Walsh decover is then utilized to generate a soft estimate of code symbols corresponding to the soft estimate of the chip sequences. A number of symbol slicers are then used in parallel to produce a hard estimate of the code symbols corresponding to the soft estimate of code symbols generated by the N chip Walsh decover. Thereafter an N chip Walsh cover is used as part of a scheme to generate a hard estimate of chip sequences corresponding to the hard estimate of the code symbols generated by the symbol slicers. The hard estimate of the chip sequences generated with the aid of the N chip Walsh cover, and the soft estimate of the chip sequences generated by the equalizer, are used to generate a tracking mode error signal to adapt the response of the equalizer to the received signals.

VI. Office Action Prior Art Rejections

In paragraph 3, the Office Action rejected claims 1-4, 7-12, and 15-22 under 35 U.S.C. §103(a) as unpatentable over Arslan in view of Smee. Applicants respectfully traverse these rejections.

With Respect to Claims 1, 9, and 17: Claim 1 recites:

A method of equalizing digital data signals, comprising the steps of:
demodulating and decoding an input signal having input data to produce a data output;
remodulating the data output to produce a pseudo-training sequence including an idealized input signal; and
generating equalizer parameters from the pseudo-training sequence.

According to the Office Action, Arslan teaches a method of equalizing data signals as follows:

"demodulating and decoding an input signal having input data to produce a data output (101B and 102B in FIG. 4B);

"remodulating the data output to produce a pseudo-training sequence including an idealized input signal (103B in FIG. 4B, column 10, line 67 to column 11 line 2 wherein block 103B is interpreted to perform the remodulation"

The cited portions of the Arslan reference are recited below:

and encoder **104B**. The successive cancellation block of
65 FIG. **4B** is similar to that of FIG. **4A** with the exception that the estimate of the first information sequence is decoded using decoder **102B** and re-encoded using re-encoder **104B**

before modulating and extrapolating the estimate of the first information sequence using modulator **103B** and signal extrapolator **105B**. The estimate of the first information

The Office Action next argues:

"Arslan does not teach, generating equalizer parameters from the pseudo-training sequence. However, Smee et al. teaches generating equalizer parameters from the pseudo-training sequence (col. 2, lines 9-15)"

Essentially, the Office Action's rejection is based on the notion that Arslan teaches generating a pseudo-training sequence. It does not. Arslan teaches remodulating a data output, but Arslan teaches that the remodulated data is used to perform successive cancellation operations. Nothing in Arslan even remotely suggests terming that data as a "training sequence" or using it as a "training sequence." That notion is the product of hindsight reconstruction on the part of the Office Action.

Properly read, Arslan does not teach anything akin to a training sequence and in fact, teaches away from equalization. Arslan teaches that one of the ways of reducing the effects of co-channel interference is by the use of "combined equalization."

> Due to the limited availability of the signal spectrum, cellular radiotelephone systems have been developed wherein carrier frequencies are re-used in distant cells to increase spectral efficiency. Because of this frequency reuse, however, co-channel interference may be present at both mobile terminals and base stations. In response, there have been efforts to develop signal enhancing receivers to reduce the effects of co-channel interference. For example, see the reference by Medepalli et al. entitled "Combined Equalization And CoChannel Interference Cancellation For The Downlink Using Tentative Decisions" (IEEE 1999) the disclosure of which is hereby incorporated herein in its entirety by reference.

Arslan goes on to describe that co-channel interference can also be achieved with channel separation, but that such channel separation must be performed before reception.

> The effects of co-channel interference (CCI) can conventionally be reduced by providing signal separation in the transmission of different signals. Cochannel signal separation is conventionally provided in an FDMA system by providing physical separation between two transmitters using the same carrier frequency and between the respective receiving base stations. Accordingly, a first signal is received by the first base station at a significantly higher strength than a second signal, and the second signal is received by the second base station at a significantly higher strength than the first signal. As cell sizes are reduced to provide greater capacity, however, the differences in signal strengths may be reduced making it difficult to receive one or both co-channel signals. Interference from signals transmitted on adjacent carrier frequencies (adjacent channel interference or ACI) can be accommodated by filtering the carrier frequency of interest.
>
> In CDMA systems, signal separation is provided during transmission by correlating a first signal with a first spreading code and correlating the second signal with a second spreading code. The two signals can then be separated by decorrelating the desired signal with the respective spreading code. In other words, channel separation is provided during transmission through the use of different spreading codes.
>
> The reception of co-channel signals without prior signal channel separation during transmission, however, may be difficult. Accordingly, there continues to exist a need for methods and receivers that can receive multiple information signals over a common carrier frequency.

Arslan then goes on to describe his system ... one that is said to solve the co-channel interference problem using successive cancellation. There is no other reference to equalization, because his invention is presented as an alternative to equalization.

Further, even if Arslan disclosed using both equalization and successive cancellation, Arslan would teach the use of a training sequence, as described in his "Background of the Invention" ... not the pseudo-training sequence of the Applicant's invention.

The Applicants therefore respectfully disagree that Arslan teaches the use of a pseudo-training sequence generated from the remodulated data output.

The Applicants again disagree. Smee teaches generating equalizer parameters from a training sequence (not a pseudo training sequence). Since there is no teaching in Arslan to use the remodulated data as a pseudo-training sequence, the question then becomes whether one of ordinary skill in the art would use a signal cancellation signal as an input to an adaptive equalizer. Respectfully, the Applicants cannot see how this could be the case.

The motivation proffered by the Office Action:

> It is desirable for a receiver to generate its equalizer parameters from a pseudotraining sequence. Estimation of channel effects using a training sequence produces equalizer parameters that are more accurate, and thus, resulting in more accurate reproduction of the transmitted signal. Therefore, it would have been obvious to one of ordinary skill in the art a the time the invention was made to include generating equalizer parameters from a pseudo-training sequence, as Smee et al. teaches, in the equalization method of Arslan et al., in order to result in a more accurate reproduction of the transmitted signal.

misses the mark. Arslan does not describe an equalization method, nor does it teach the use of a pseudotraining signal generated from a remodulated data output.

Claim 9 and 17 recite analogous features and are patentable for the same reasons.

With Respect to Claims 2, 10, and 19: Claim 2 recites:

> *The method of claim 1, wherein the step of generating equalizer parameters from the remodulated data output comprises the steps of:*
> *buffering the input signal; and*
> *comparing the buffered input signal to the pseudo-training sequence to produce the equalizer parameters.*

According to the Office Action, Smee teaches buffering the input signal at column 11, lines 32-33 as follows:

> operation. In the exemplary system **300**, the chip sequences outputted by PN despreader **308** are buffered in DEMUX **312** and then demultiplexed on 16 parallel lines to "N chip Walsh decover" **314**. It is manifest that in other embodiments, a one-to-64 or a one-to-128 demultiplexer can be used without departing from the scope of the present invention.

and Smee teaches comparing the buffered input signal to the pseudo-training sequence to produce the equalizer parameters as follows:

> der of the frame. As user message data are received, the adaptive algorithm of the equalizer tracks the changing characteristics of the transmit filter, the communication channel, and the receive filter. As a consequence, the adaptive equalizer is continually changing its filter characteristics over time.

wherein 'tracks the changing characteristics' is interpreted as the "comparing" step recited in claim 2.

The Applicants respectfully disagree. For illustrative purposes, claim 2 is illustrated in the Applicant's FIG. 13:

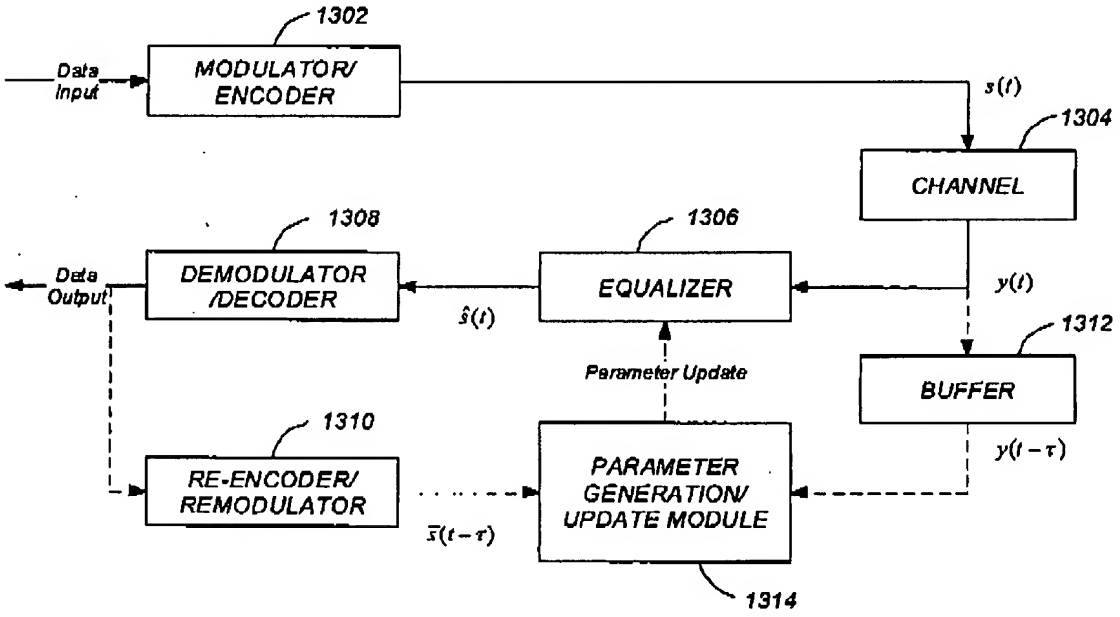

FIG. 13

The buffering referred to in claim 2 refers is buffering of the input signal, and that buffered input signal is compared to the pseudotraining sequence obtained by remodulation. This buffering is performed to account for the time delay in the remodulation process. The buffering described in the Smee reference refers to buffering that is performed as a part of the demodulation process shown in block 1308. It does not disclose buffering of the input signal. Nor is that buffered signal compared to a pseudo-training sequence to produce the equalizer parameters.

Claims 10 and 19 recite analogous features and is patentable for the same reasons.

VII. Dependent Claims

Dependent claims 2-8, 10-16, and 18-24 incorporate the limitations of their related independent claims, and are therefore patentable on this basis. In addition, these claims recite novel

elements even more remote from the cited references. Accordingly, the Applicant respectfully requests that these claims be allowed as well.

VIII. Conclusion

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

Date: April 24, 2007

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